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CONVENTION NOTICE
King Edward Hotel
June 25, 26, 27, 28, 1928
Ha, Ha! Skinney Wada say
Convention today
Down Toronto way.

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American Electroplaters Society

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VOL. XV APRIL, 1928 No. 4

EDITORIAL

Next month the time of May flowers and selection of officers and representatives to our annual meeting, will soon be upon us and it behooves us to think quickly and well for the future growth of our society before our winter hibernation gives vent to the lanquidness of the 666,900 miles of good paved roads we are wont to investigate this summer in U. S. A.

Look well to selection of your officers, pay extra attention to your selection of representatives to the Supreme Council or delegates to convention as they are all potential candidates for supreme office and should be an improvement over their predecessors to show progress for ourselves and society.

Then remember that the Toronto branch of our society has worked hard all winter to perfect plans for a successful convention and your approval by attendance to same is all the recompense they ask. Small pay for their untiring efforts, but what a grand and glorious feeling it will give the boys of that branch to see 700 or 800 members and visitors at Toronto, June 25th to 28th, 1928. Can any of our members afford to miss this meeting?

ART METAL DEPOSITS

Fred L. Greenwald, Chicago Branch

In these chromium days when we see chromium and hear chromium most everywhere we turn, I think it will be a relief to read a paper on a common subject for the platers to digest, at least that is the argument the chairman of this program used when he induced me to contribute this paper. The title could just as well have been "Metal Deposits on Art Objects" and would then have been self-explanatory.

In choosing my subject I picked out an old one and one that I have been working with in a commercial way for the past five years.

We older members of this society sometimes forget the rising generation within our ranks, when we look upon certain old subjects as common knowledge, forgetting that there may be in our midst someone who is looking for just such information.

Some few years back metalizing was being done by platers here and there only in an experimental way, more for the purpose of seeing whether they could turn out a finished piece than for production purposes.

This class of work can be turned out commercially and is being turned out every day on a production basis.

The methods pursued can be applied on any non-metallic surface with but slight variations.

When we study the underlying principles then the treatment of any substance is comparatively easy. The thoughts to bear in mind are safeguard piece from becoming saturated while suspended in plating solution, cover the article with a metallic film so that the deposit can get started, choose a metal to deposit that will cover easily and quickly, and one that can be deposited quite heavily.

Briefly outlined, the procedure is as follows: If the substance to be coated is porous, then saturate it with a waterproofing material—the material required is governed chiefly by the cost and the ease of applying. If the substance is already waterproof, such as wax or glass, it is not necessary to give waterproofing treatment, but just proceed with the regular preparation of coating with shellac, varnish and copper powder (with wax the surface can be rubbed with copper or graphite powder direct). The graphite process is not used extensively on art objects on account of the

length of time it takes to completely cover the surface, copper powder is a much better conductor.

In outlining this process I have in mind the one we used in doing ornamental bronzes such as lamps, book-ends, fire screens, statuary, etc., and will endeavor to explain some of the little kinks and stunts we devised for handling such work in quantities.

First of all, in doing plaster of paris articles, we would insert a screw in base while plaster was setting, having screw flush with bottom and where it would not show when piece was completed. The only exception was on lamp bases which had an iron pipe of suitable size cast into them for the final operation of wiring as a lamp.

The advantage of having a screw cast into the base instead of the usual piece of copper wire, was that we could fasten a rack to this screw when starting out and leave it on through the whole procedure from start to finish, the same holds good with lamp bases as the rack does two-fold duty here, it screws into end of pipe afterward used for socket or light cluster, and prevents the threads from being coated.

An added advantage of using rigid racks is that work can be handled easier in subsequent operations and prevents them from striking each other while moving in plating bath.

Our racks were arranged in such a manner that we had loop about half way up, upon which they could be hung while work was being prepared for metalizing.

The extreme top of rack was straight to be inserted in hole in cathode rod where thumb screw would fasten it. This would prevent plaster articles, which were not weighted, from floating on top of solution. Where weight was desired, pieces of scrap iron were cast into articles.

These racks could be used over and over again and owing to the alternate layers of copper and shellac the deposit was easily removed when it became too heavy. On bottom of rack where it fastened to work was a small brass button which would draw up against the object to be plated and would insure good contact.

Now we will proceed with following steps. After piece was properly racked it was dipped into hot crude scale wax, this would waterproof it and by thoroughly saturating it, would also add considerable to the weight, which is desirable on plaster objects. We selected crude scale wax because it gave us the results desired and was not as expensive as parafine, after being thoroughly saturated with hot wax it is hung on rack to cool.

When immersing in hot wax do it gradually especially if work is plaster of paris. Be sure that the plaster is thoroughly dried out. If it is not dried out or is immersed in hot wax too suddenly, even if dry, it will surely crack and break owing to the sudden change in temperature, but with care and proper handling the most delicate pieces can be successfully treated.

After being waxed and cooled they are ready to be coated with shellac. We found thin shellac to be the best medium to use over the waxed surface, two or three coats, or more if necessary, to give a nice glazed surface before applying the varnish.

Varnish applied directly on wax will not dry, and there is not sufficient wax on surface to hold powder, hence the intermediate layers or coatings of shellac. Good results can only be obtained by allowing the several coats of shellac to dry thoroughly, but here is one reason why shellac should be used, it dries quickly.

The reason for using several thin coats of shellac is that you will not lose as much detail if you brush it out good between coats and brush off the drip.

When you have obtained a good, dry, glazed surface, it is then ready for one coat of varnish thinned down with benzine.

In coating with shellac and varnish we preferred the dipping method because you are sure to get it in all the crevices and corners, which is very important on account of being more difficult to deposit in recesses.

After coating of varnish is applied, brush good to get an even coating and hang aside until it becomes tacky or almost dry, which takes about one hour or more, depending on the consistency of the varnish.

Now we are ready to apply the copper powder. Get the finest copper lining powder that you can because the old rule holds good here as well as in other plating processes, that is, the smoother the surface you start out with, the smoother the final coat will be, especially is it true in this case as we put on a heavy deposit.

After applying the powder, which is dusted on with a fine camel's hair brush and worked over surface until a smooth glossy coat of copper is obtained, the article should hang until the varnish under the powder is thoroughly dry.

The above operation is very important because if you let varnish get too dry your powder will not adhere and if varnish is not dry enough your surface will be streaked and rough.

The reason I prefer the varnish and dry powder method to the

one using powder mixed with a bronzing medium and sprayed on, is that in mixing powder with liquids you do not have a perfect metallic film on surface and object will not cover as readily. Also in the spraying operation you often find it difficult to reach the deep recesses without getting too much on projecting parts.

The next operation is to plate it in an acid copper bath. The article is washed in clean cold water and if possible spray it with cold water to remove excess powder in recesses and crevices. It should then be dipped into a silvering dip composed of approximately 10 oz. sodium cyanide and 5 oz. silver chloride to each gallon of water. This will give you a film of silver which causes the copper to cover the article shortly after it enters the bath. Without this film of silver the deposit would just creep over and in some cases it will take hours to completely cover surface, and in some instances will not cover at all, which means revarnishing and repowdering.

With the method of preparation I have just outlined we seldom had to remove any pieces from plating bath for repowdering. Of course it is understood that work must be well rinsed when coming from silver dip and before going into copper bath.

Of the various methods of agitation and oscillation we found that moving cathode rods gave better results than agitated solutions on account of the sediment that is continually in circulation when compressed air is used, unless a continuous filteration is used, in which case air agitation is satisfactory. On one set of tanks, on account of their shape and size, we could not use horizontally oscillated cathode rods so we arranged them to move up and down with equally good results.

For best results on this class of work use some form of agitation.

After work is started in copper bath and is covered all over it is run at a maximum current density without burning corners or protruding sections until the required thickness is obtained. This is governed by the grade of finish that is required. The more copper you deposit, the more metal you have to grind and buff for a final finish.

Our various pieces ran from eight to twelve hours with the exception of a fire screen which ran for forty to obtain the required thickness. Before proceeding further I will explain method we used in building fire screen. This was a solid copper panel, thirty-six by thirty-three inches.

We made a thick plaster case of face (reinforced with fibre to prevent breaking) and then metalized the one side the same as we did other plaster objects. When the required deposit was obtained we removed the plaster cast and had the side next to the plaster for the front, which gave us practically a finished surface.

Now to get back to work in process. When it is removed from tank, rinsed in cold water and let dry, it is ready for polishing and buffing.

Grinding should not be necessary if work is not run too fast or too long, but when it is, just touch up spots which are rough on a polishing wheel of proper size.

All our work was finished by sand buffing with a rag wheel, pumice and grease oil, because in that manner we could get a good surface without heating the article and without loading it up with buffing compositions hard to remove.

Right here let me emphasize the necessity of keeping a metalized object away from heat as much as possible. When it comes from tank do not dip in hot water. When you buff it keep it as cool as possible. When you clean buff dirt from surface keep it out of hot cleaners as much as possible and so on right through to the final operation. Keep it away from heat.

The reason is this: With the various substances underneath the copper shell, including the wax, the heat would separate your copper shell and although it would not fall off you would always have a loose and unsatisfactory plate. The method we used in separating our fire screen from the cast was by applying heat.

When you have proceeded this far, all that is left to do is to select the finish you desire and apply it in the regular manner.

Any good acid copper solution should give good results on this class of work. The one we used stood 21° B. and consisted of approximately 28 oz. copper sulphate and 10 oz. sulphuric acid per gallon with a very small amount of glue added for keeping deposit smooth.

NICKEL PLATING SHEET ZINC IN A NICKEL AMMONIUM CHLORIDE SOLUTION

By Charles H. Proctor

Previous to the advent of the Double Nickel Salt Solution by Isaac Adams in 1878, the Nickel Chloride Solution was universally used for whatever Nickel Plating that was applied to fabricated metal goods at that period. It was in the interim between 1878

and 1886 that plating dynamos began to be manufactured in America, of sufficient current capacity to enable the manufacturer of metal goods to copper, brass and bronze plate from cyanide solutions, as well as to nickel plate from Adams' solution. Three types of dynamos used by the writer up to 1888 were: The Weston Dynamo; the Little Joker, manufactured by Wallace & Sons, Ansonia, Conn.; and the Eddy Dynamo, manufactured by the Eddy Electric Co., Windsor Locks, Conn. The latter dynamo was the first absolutely reliable machine that permitted electroplating upon an extensive scale at that period, without the acute problem of the dynamo's changing its polarity at any time without any warning, except a rumbling noise as though the dynamo was going to pieces. Due to this cause the Weston dynamo was a service of constant trouble, and many times during the interval of a week all the goods being plated would have to be removed, anodes hung upon the cathode rods in excess, and the polarity of the rods changed for a short time until a reversal of the current resulted. This constant change of polarity, due to the least overloading of the dynamo's current capacity, resulted in a considerable financial loss: Not only was time lost, but quite frequently articles being plated when the reverse occurred had to be repolished and replated. Many times, however, we had to continue to plate under the changed polarity conditions by reversing the current leads, until the dynamo itself would again change to its normal polarity. With the advent of the "Little Joker" and the "Eddy" dynamos, this serious problem was eliminated, and no trouble, due to reversed current, resulted.

It has already been stated that previous to the advent of Adams' double nickel sulphate solution nickel chloride solutions were used exclusively both in England and Germany. I know for certain that such solutions were used by the firm of Thomas Smith & Sons, Saltley near Birmingham, England, in nickel plating bicycle parts, both for the high bicycles and for a safety bicycle type manufactured by them in 1880. The current necessary for operating the nickel chloride solutions was obtained from accumulators, preceding the dynamo. I have a faint recollection of visiting the plating department of this firm many times, asking questions regarding the process of plating. I also remember that the deposit upon the articles was a dull finish with a yellow tinge, but after polishing by the then known methods, a good lustre was obtained, although the yellow tone, if my memory serves me correctly, was still visible in the finished product.

I have often wondered why no attention has been paid to the possible utilization of modified nickel ammonium chloride solutions. We all know the value of certain chloride solutions, the greatly increased throwing power obtained from them, and the greater anode corrosion that is possible from a high chloride solution. Recently I became deeply interested in nickel ammonium chloride solutions for several reasons, more especially for the purpose of depositing nickel directly upon polished sheet zinc without the development of black streaks in the deposit. By the use of normal current densities very rapid deposits were obtained without hydrogen absorption by the zinc. Many formulas of the nickel ammonium chloride type were tried out, finally the following formula was developed:

Water	1 gallon
Nickel Chloride	6 ounces
Ammonium Chloride 98/99%	6 ounces
Sodium Perborate	1/15 ounce
Pure Hydrochloric Acid	¼ ounce

Temperature: Normal. *Current Density:* 5 to 6 volts. *Amperes:* 50 per square foot of surface area. The current density may be reduced by 50% or more after the first minute of deposition at the high current density. *Anodes:* 95/97% Cast Nickel. However, rolled anodes, annealed dead soft, should prove to be the ideal anode for this type of solution.

The method of preparing the solution was as follows: The nickel chloride was first dissolved in one-third of the total amount of water at 160° Fahrenheit; then the ammonium chloride was added with constant stirring until all dissolved. The balance of the water was now added cold, whereupon the Sodium Perborate was added in small proportions with constant stirring. Finally the Hydrochloric Acid was added (liquid measure) and the solution stirred thoroughly. It was then ready to operate at 70° Fahrenheit under the usual normal plating conditions. No trouble was experienced in plating sheet zinc direct without black streaks, and ample nickel was deposited at the maximum current density in four minutes to withstand any final polishing operation. It is absolutely necessary that this type of solution be controlled by Volt and Ampere meter, the control of the ph, when once established, is important. Any pealing due to hydrogen occlusion in the deposit must be controlled by Sodium Perborate addition. The nickel deposit upon the samples shown you, you will note, is very

adhesive; on the bending test the nickel still holds firm when the zinc sheet is broken in two, showing the tenacious nature of the nickel deposit. Another factor of interest was noted in the bending test: sheet zinc plated in the special nickel chloride solution still retained its original malleability, whereas sheet zinc plated in normal solutions of the sulphate type became less malleable, presumably due to deposition of Hydrogen, and therefore would not withstand as many right angle bends as sheet zinc plated in the solution outlined heretofore. Therefore nickel plated sheet zinc, plated in this solution, can no doubt be readily fabricated within the limits for unplated sheet zinc, without any danger of the nickel pealing from its surface. We must, however, be sure that the sheet zinc is perfectly clean; only unusually mild alkaline cleaners should be used in cleansing sheet zinc, f.i. cleaners of the Tri Sodium, soda ash, cyanide type or cleaners operated electrically from such basic materials. Those interested in Nickel Ammonium Chloride Plating solutions of the type advocated by the writer should try out commercially such solutions and thus determine their value to them in nickel plating operations.

The great throwing power of this type of solution should prove of value in plating many articles that require to be plated at a minimum of cost and still to have a uniformly coated nickel surface in a minimum of time.

The Bureau of Standards, in their Circular Letter L C 125, July 28th, 1924, entitled, "Throwing Power in Copper and Nickel Deposition," stated in paragraph No. 6, "Nickel Chloride Solutions":

"Solutions containing all the nickel as chlorides, 'such as were used in the early days of plating,' possess very good throwing power. The deposits obtained by us were darker than normal, so that further work will be needed before the use of such solutions could be justified."

The author of this paper anticipates that the Bureau of Standards will be able through further research work to establish the fact that such solutions will be justified in the electro-plating industry, and will give very efficient results under correct solution conditions.

In plating sheet zinc, previously copper plated, in the electro-cleaning and copper plating solution prepared with tri-sodium phosphate, soda ash, and sodium cyanide and copper cyanide, the following solution can be used with excellent results, especially

in nickel plating direct upon cadmium deposits upon steel, either polished or unpolished, as the product comes from the cadmium solution:

Water	1 gallon
Single nickel salts	12 ounces
Boracic acid	2 ounces
Ammonium chloride	2 ounces
Magnesium sulphate	12 ounces

The solution should be prepared along the same lines as given for the nickel ammonium chloride solution.

This type of solution, with minute additions of cadmium chloride, 1 grain minimum per gallon of solution, can be used as a bright nickel solution for most metals. The ph control is an important factor, as well as the hydrogen content, which can be readily controlled by small additions of sodium perborate, 1/64 ounce per gallon minimum. The upkeep of the nickel ammonium chloride solution should be done with nickel chloride and small amounts of ammonium chloride as the conductive factor.

The upkeep of the single nickel salt magnesium sulphate solution can be readily taken care of by the addition of 2 parts single nickel salts and 1 part nickel chloride, as required. The magnesium salt is quite constant, so does not need to be added more than at intervals.

I trust that the data given in this paper will prove an advantage to the members of Chicago branch, as well as the society at large.

CHROMIUM PLATING

By Jacob Hay, Chicago Branch

Gentlemen: It is indeed a pleasure to greet you. In such organizations as ours, made up of men, in the true sense of the word, who are doing their share to make each one of us more useful, and in our particular calling better platers. I will note as follows:

In order to be able to plate chromium every hour in the day without holding up production, one must be sure to have the right installation on the chromium tank. You must have ample buss-bar capacity and a large volume of solution temperature control, a current flow always from 3 to 12 volts, so that you might get any current pressure you may need at the turn of your fingers. Then the racking of the article to be plated is no small problem to contend with. For instance, the writer was called upon to plate some valve stems for a motorcycle engine of a well known repu-

tation. The stem had to be plated ½ of 1,000th of an inch, of uniform thickness, both near the valve seat and at the end of the valve stem. The valve seat was not supposed to receive any plating whatever. For this reason we could not get a plate of uniform thickness, and it was up to us either to lose our job or use our brains. The latter is always easy if one will try. The racks we designed were made of ¼ by 2 inches. Copper strip holes were drilled in the bars to make a perfect seat for the valves, so that the valve seat would not receive any plate. The rest of the copper bar was insulated with one-eighth of an inch thick celluloid attached to the bar with steel rivets. The valves were held in the holder by spring tension. In order to get a uniform plate around the end of the valve stem, it became necessary to have a conductor of a known size in front of the end of the stem, to take up the excess amount of metal that we did not want at that end of the stem. In that way we were able to turn out 2,000 valve stems a day with one operator. The distance from the anode to the cathode in this case was 6 inches; the temperature was 128 degrees Fahrenheit at 6 volts' pressure. The amount of valves in the tank at all times was 200 pieces; the time of plating was 20 minutes. The slightest variation in the temperature and the P. H. of the solution would change the appearance of the deposit and naturally the grain of the deposit. This concern had trouble with their motor due to the fact that the valves would always stick on overheating the motor. After the valves were chromium plated one motor was operated at high speed continuously for 500 hours, and after removing the valves they showed no sign of wear. Bath room goods, such as faucets, soap holders, brass tubings, etcetera, are in most cases all plated on brass due to the fact that chromium will sometimes loosen the nickel from the base metal.

Chromium plating has taught us many things that we did not know before. We have learned that we did not do good nickel plating up to this time. In other words, we have learned how to put on nickel so it will stay on without letting loose from the base metal, and the plater that has not learned this will find out to his own grief that he will have to before he gets through. It is always best to plate chromium on nickel, as one will get much better finish and also a better color. Brass requires too much buffing after plating. Chromium plating done on nickel will require no buffing whatsoever.

We color chromium plate with lamp black and kerosene, just

enough to take the water stains off of the surface. We find in our line of work, which consists of the plating of automotive lighting equipment, that after we get a good adhesive coat of nickel we nickel color our work very clean, and plate the chromium on the nickel without any cleaning. There are a good many reasons why we are not doing any cleaning; one is: if we have pockets where the cleaning solution may stay in, it will do all kinds of harm to the chromium bath. One could talk for hours on this subject and never finish.

I will try and explain the kind of tank that we find very good for chromium plating. We have one outer and one inner tank so arranged that we have steam coils and water in the outer tank and a glass lining in the inner tank with no coils. We have an automatic heat control on this instrument. The anodes and buss-bars are held in place by brackets cast from iron in which we have fiber insulators. The # negative buss bar is so arranged and insulated from the tank. Generator is 5000 amperes, 6 and 12 volts, and a three wire system, so that we can get either below 6 or up to 12 volts by throwing our switch from one to the other line, and with the field rheostat we can regulate our generator and we are able to plate 160 heat lamps per hour. The solution is strictly the Sargent solution without any other additions. Poor throwing power indicates not enough chromic acid. White and smutty deposits indicate P. H. too high. Chromium carbonate will overcome this. If bath becomes stagnant the concentration of the bath is too high. This, of course, only holds good when temperature of bath is correct.

Another important factor is to know when the article that is chromium plated is covered all over. This is hard for the ordinary eye to determine in ordinary light. So we solved this problem, by having blue lights so arranged that the rays of the blue lights will have to pass through a very white drawing paper, or white waxed paper. We can then very easily distinguish the nickel from the chromium, and tell if the parts were thoroughly covered with chromium.

One often hears this question asked. What is a good insulating material for plating hooks? I have found that any good rubber with very little carbon in it is a good insulator.

Another very good material is called pyralin. This material can be applied like hard rubber and resist the action of chromic acid.

I want to impress on all those that are interested in chromium plating that the size of copper used for hooks is very important as it would be very foolish to use any hook that will carry say, about 100 amperes, if we know that the article we want to plate will take 200 or 300 amperes per square foot.

In closing, let me say again to you that it has been a great pleasure to be with you. If my remarks on this subject of chromium plating have been helpful, I am more than pleased.

Discussion on Chromium Plating

Mr. Lippens: What action has a syrup beverage, such as orangeade, on the chromium?

Mr. Servis: I think that is principally an element of citric acid and would have no affect on chromium.

Mr. Lippens: After being in the beverage for three weeks it looked just like iron filings.

Mr. Servis: Mr. Nixon, what would your idea be of that?

Mr. Nixon: What color was the surface that came back?

Mr. Lippens: It resembled an iron filing. (Sample shown.)

Mr. Servis: Now here is a condition that occurs in acitating orangeade and other beverages. This was plated on silver and has caused a corrosion on the metal which shows a reddish-brown stain similar to a corrosion on iron, although the structure of the article itself is brass. No trouble whatever was encountered with stainless steel.

Mr. Nixon: Was any attempt made to ascertain whether or not chromium came off?

Mr. Lippens: It did come off by rubbing it. We found some fine parts of chromium on the fingers. The second sample held perfectly. The one chromium plated over brass, nickeled and then chromium plated, that didn't come off at all, but stained up the same way.

Mr. Nixon: I suggest testing it with nitric acid to see if there is chromium there. If not, it might have come off. Nitric acid will not affect the chromium but it will affect the brass.

Mr. Servis: Here is a container used for similar purposes. It is used for lemonade, etc. Have you (indicating) ever found such a condition similar to that?

Mr. Allen: We found in running test pieces for salt test, plating 7 to 8 minutes, I think is the point, we didn't have a breakdown. Between eight (8) and somewhere around twenty (20) there were breakdowns in the salt spray test. After that point there weren't. It seems that between eight and twenty practically everything broke down. It seems there is a porous deposit between those points. I don't know how long this was plated, but we were very much surprised to find that when we plated things ten minutes it wouldn't stand up whereas five minutes would, and all test pieces were hung exactly the same.

Mr. Servis: Of course, minutes don't mean a thing; the amount of amperage is what counts.

Mr. Allen: The second one was run for five (5) minutes.

Mr. Lockerbie: This particular piece had 100 amperes on it and was run for 7 minutes. All corners were bright at that time, and the surface apparently was all covered. We put it under our test shade and it looked as though it was covered very good. This was in for three days in this beverage and the difference started to show up. This particular piece was silver plated on brass and we chromium plated over the silver and the second piece now in the test was nickel plated over the brass and has five minutes over the nickel.

Mr. Servis: I believe we can plate too fast in chromium, and we can also plate too slow, as in nickel—the first may cause corrosion, roughness, pinholes, etc., the latter would of course defeat the object.

Mr. Hay: I just like to warn the gentlemen that when they say you plate "7 minutes" and use "100 amperes" it means nothing. Unless you have absolute control of your sulphates it means nothing regardless of the number of amperes you use.

Mr. Servis: The efficiency of a chromium solution is usually only 12% and sometimes you find only 10%.

Mr. Wilmore: Silver will oxidize very readily and it might be that there was a certain oxidization on that silver before it went into that solution.

Mr. Goodsell: We have been plating quite a lot of chromium on brass and we made quite a few tests on chromium over brass, but it really don't seem to stand up. Whether it is the zinc in the brass I don't know, but I don't think chromium over brass is very successful. We found that chromium over nickel deposited on brass or copper gives a more satisfactory plate and lasts longer and wears better than anything else you can possibly do. These containers (indicating) are nickel silver, they are plated inside and out, and nickel silver. These have been put to a test of lemon juice and have stood a very severe test, whereas chromium directly on the brass does not stand up anywhere near as well as chromium on nickel silver or even on nickel.

You will have a hard job in trying to get the nickel plate to stay on and you will find that the tests that you put your articles to with a deposit of chromium over nickel will outlast and outwear any test with the chromium directly over brass. Nickel-Silver is easy to plate and the chromium directly on the nickel silver will give very good results.

Chromium over brass is harder to deposit, it is harder to throw, but the lasting quality of chromium over brass is not so good, and I would say that with that article (indicating) that if that is chromium over brass or even chromium over silver that has been previously put over brass, it might have been possible that something has come through the brass to the chromium.

Mr. Proctor: If you ever attempt to chromium plate on silver you will find that the deposit will not be thick enough. It seems to me that the problem was that there was some silver chromate formation and the silver chromate was like an oxidizing factor and the chromium didn't adhere to the basic surface. But speaking about brass. You can plate brass, but it all depends upon your solution but you can't plate brass with very high density solutions. You must come down in your chromic acid. The other day I took some very fancy shoe buckles and used a solution of 16 oz.

chromic acid, 8 gr. chromate of iron, and 8 gr. chromic sulphate, and an addition of less than 1 c. c. of sulphuric acid per gallon. The chromium went on the brass in a moment. I took some polished pieces of brass, buffed them up, wiped them dry, and put them in the solution and there was no trouble at all in the plating.

Mr. Lovering: We get a wonderful deposit on brass but as a serviceable wear there seems to be some electrolytic action after the article is used on the market; the chromium seems to soak in and the chromium does not stay there. So I don't think it a very good policy to do a great deal of chromium plating directly on brass.

Anonymous: How does Mr. Hay determine the P. H. in the solution?

Mr. Servis: Mr. Hay, what is the P. H. of your solution?

Mr. Hay: The amount of sulphate in a chromium solution would be 0.2.

Mr. Proctor: The Studebaker Corporation has established it as between 4.5 and 5.4. In other words, the P. H. of nickel is absolutely the correct P. H.

THE ANALYSES OF PLATING SOLUTIONS

By Charles Kemish and Benjamin Deakin of the Toronto Branch A. E. S., Canada

The methods here given are those that are carried out at the Toronto Technical School by the members of the Toronto Branch, and serve well for the control of solutions. Believing, as we do, that they are more simple than most methods found in various text books, and which any plater with ordinary intelligence can readily understand. These methods require very little time and less figuring than some analyses do. It must be thoroughly understood that in all these analyses distilled water must be used and the chemicals must be absolutely chemically pure (C.P.).

Analysis of Nickel Solution (Ni is the symbol for Nickel)

Estimation of Metal in Solution.

Standard solutions required.

Potassium Cyanide (K CN) = 33.3 gms. per liter (g/l) or Sodium Cyanide (Na CN) 98/99%, 24.98 g/l.

Silver Nitrates ($Ag\ NO_3$) = 13.037 gms. per liter (g/l).

Indicator:

Potassium Iodide (K I) = 100 gms. per liter (10% solution).

1. Fill two burettes, one with Potassium Cyanide and the other with Silver Nitrate.

2. Take 10 cc. (cubic centimeter) of $Ag\ NO_3$ in a beaker or glass.

3. Run in 5 cc. of K I.
4. Run in K CN until the solution clears.

Calculations:

$$\text{Factor} = \frac{10}{R} \text{ of K CN used.}$$

Example:

5 cc. of K CN used $10 \div 5 = 2$ (Factor is 2).

The Sodium Cyanide solution of 24.98 g/l may be used in place of the potassium cyanide.

1. Take 10 cc. of Ni solution.
2. Add about 20 cc. of Ammonium Hydroxide (NH_4OH) (C P).
3. If a precipitate (ppt) forms, it is probably due to iron and the solution should be heated and filtered.
4. To the clear filtrate add 5 cc. of K I.
5. Add 75 cc. of distilled water (H_2O).
6. To the solution above treated run in a few drops of $Ag\,NO_3$ (say about 6 drops).
7. Run in K CN until the solution clears.
8. Now run in $Ag\,NO_3$ until a yellow turbidity appears.

Calculations:

Divide the reading on the $Ag\,NO_3$ burette by the factor.

Subtract this value from the reading on the K CN burette.

Divide the result by 10, which gives ounces per United States gallon (oz/U.S. gal.).

Example:

10 cc. of $Ag\,NO_3$ used $= 10 \div 2 = 5$ (This includes the 6 drops used previously).

$$30 \text{ cc. of K CN used} = \frac{30 - 5}{10} = 2.5 \text{ oz/of metal/U.S. gal.}$$

Note—*To convert metal Ni to salts:*

Multiply by 4.75 for single salts.

Multiply by 6.75 for double salts.

Estimation for Acid in Ni Solution:

To determine the free acid in an Ni solution a quantitative analysis must be made.

To determine acidity of an Ni solution the color method should be adopted as per the P H system.

Method of Analysis:

Standard Solution

Normal Tenth (n/10) Sodium Hydroxide (Na OH) 4.005 g/l.

Indicator

Bromo Cresel Purple 0.04%.

Method of Titration:

1. Take 50 cc.'s of Ni Solution, filter if necessary and place in a beaker.
2. Add 5 to 10 drops of the indicator.
3. Run in n/10 Na OH until the solution turns a deep green color.
4. Each cc of n/10 solution used in titrating a 50 cc sample of Ni solution corresponds to 0.080 g/l of Na OH, or 0.011 oz/US gal., or 0.0178 oz. NH4 OH/U.S. gal.

Calculations:

R $\times$ 0.011 = oz Na OH required to neutralize one U. S. gallon.

R $\times$ 0.0178 = oz of NH^4 OH to neutralize one U. S. gallon.

n/10 Na OH = 4.005 g/l.

Therefore 1 cc. of Na OH = 0.004 g/l.

To titrate a sample of nickel solution first note carefully whether it is "acid" or "alkaline" to brom-cresol purple by adding 5 to 10 drops of the indicator to 50 cc.'s of filtered sample. If the color observed is greenish yellow the solution is "acid." If the color is violet the solution is "alkaline." If the solution shows a deep green color, it is "neutral" and no titration is necessary.

Assuming that a given sample is "acid" run in Na OH from a burette, stirring the while until a permanent deep green color is produced. If in a titration as described above, 50 cc.'s of sample required 5.3 cc.'s of N/10 Na OH to titrate to neutrality the solution will require for its neutralization:

5.3 $\times$ 0.011 = 0.058 oz/gal. Na OH (Stick Caustic Soda) or

5.3 $\times$ 0.0178 = 0.094 fluid oz/gal. NH_4OH (Liquid Ammonia) sp. gr. 0.90.

Analysis of Acid Copper Solution

Free Acid in Acid Copper Bath

Standard Solution Required =

Sodium Carbonate ($Na_2 CO_3$) = 8.116 g/l (Anhydrous)

1. Take 10 cc.'s of acid copper solution.
2. Dilute to 50 cc.'s with distilled water.
3. Run in $Na_2 CO_3$ solution from the burette until a very slight ppt forms.

Calculations:

$\frac{R}{10}$ = oz Avoirdupois of $H_2 SO_4$ per U. S. gal.

Example:

15 cc.'s of $Na_2 CO_3$ used. $15 \div 10 = 1.5$ oz. of free $H_2 SO_4$ (av.) per U. S. gal.

Metal Content in Acid Copper Bath:

Standard Solutions Required—

Sodium Thiosulphate ($Na_2 S_2 O_3 + 5 H_2O$) = 29.28 g/l = (Hypo). (The common name for the above chemical is Hyposulphite of soda.)

Acetic Acid ($H_4 C_2 O_2$).

Potassium Iodide (KI) 100 g/l or 10% solution.

Indicator

Corn Starch = ½ of 1% solution.

1. To the solution used for estimating the free $H_2 SO_4$ add $H_4 C_2 O_2$ to clear the solution.
2. Add 10 cc.'s of KI.
3. Run in Hypo solution until the brown color nearly disappears.
4. Add a few cc.'s of starch solution (say about 5 cc.'s).
5. Continue with the Hypo until the blue color just disappears.

Calculations:

$\frac{R}{10}$ = oz. of Copper per U. S. gal.

Example:

35 cc.'s of the $Na_2 S_2 O_3$ used = $35 \div 10 = 3.5$ oz. of metallic copper per U. S. gal.

Analysis of Cyanide Copper Solution

Estimation for Free Cyanide in Copper Bath:

Standard Solution = Silver Nitrate ($Ag NO_3$) 13.037 g/l.

Indicator = Potassium Iodide (KI) 10% Solution (100 gms. per liter).

1. Take 10 cc.'s of solution and add 5 cc.'s of KI solution.
2. Run in Ag NO_3 until a slight but permanent ppt forms.

Calculations:

R/10 × 1.2 = oz. troy Potassium Cyanide (K CN) per U. S. gal.

R/10 × 1.2 ÷ 1.29 = oz. troy Sodium Cyanide (Na CN) per U. S. gal.

R/10 × 1.33 = oz. avoirdupois Potassium Cyanide per U. S. gal.

R/10 × 1.33 ÷ 1.29 = avoirdupois Sodium Cyanide per U. S. gal.

Examples:

48 cc.'s of Ag NO_3 used 48 × 1.2 ÷ 10 = 5.76 oz. troy K CN/U.S. gal.

51.6 cc.'s of Ag NO_3 used $\frac{51.6 \times 1.2}{10 \times 1.29}$ = 4.8 oz. troy Na CN/U.S. gal.

48 cc.'s of Ag NO_3 used 48 × 1.33 ÷ 10 = 6.288 oz. av. K CN/U.S. gal.

47.268 cc.'s of Ag NO_3 used $\frac{47.268 \times 1.33}{10 \times 1.29}$ = 4.8 oz. av. Na CN/U.S. gal.

Note: While the above method is not absolutely correct for the determination of free cyanide in copper solution owing to the presence of sodium thiosulphate (Hypo) sometimes used as a brightening agent which interferes slightly with the process, it is near enough for practical purposes.

Estimation for Metal in Copper Bath:

Standard Solutions =

"Aqua Regia" Hydrochloric Acid (H CL) 2 parts and Nitric Acid (H NO_3) 1 part.

Sodium Hydroxide 15% (150 g/l).

Potassium Iodide 10% (100 g/l).

Sodium Thiosulphate ($Na_2 S_2 O_3 + 5 H_2O$) 29.28 g/l.

Indicator =

Corn Starch ½ of 1% solution.

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1. Take 10 cc.'s of solution in an evaporating dish.
2. Add 10 cc.'s of H CL and boil to dryness.
3. When dry add 3 cc.'s of Aqua Regia (2 parts H CL and 1 part H NO_3).

4. Boil until the fumes are driven off.

5. Dissolve in a little water (distilled) containing a little H CL.

6. Neutralize with Na OH until the blue ppt. will no longer dissolve.

7. Add (dilute H CL) drop by drop until the blue ppt. just dissolves.

8. Add 20 cc.'s of KI solution.

9. Titrate with $Na_2 S_2 O_3$ (Hypo) solution from burette until the solution turns a blue color.

10. Add starch solution (5 to 10 cc.'s).

11. Complete titration with the Hypo solution (end point cream color).

Calculations =

R/10 = oz/U.S. gal.

Example:

25 cc.'s of $Na_2 S_2 O_3$ (Hypo) used = 25 ÷ 10 = 2.5 oz/U.S. gal. of solution.

Analysis of Silver Solution

Estimate for Free Cyanide:

The same method is used here as is used to get the Cyanide content in the Cyanide Copper solution, and the calculations are the same.

Metal content in Silver Bath:

Standard Solution = Ammonium Sulpho Cyanide (NH_4 S CN) 7.04 g/l.

Indicator = Iron Nitrate (Fe (NO_3) 3) 2%.

1. Take 10 cc.'s of silver solution.
2. Dilute to 100 cc.'s with distilled water.
3. Boil and pass in Hydrogen Sulphide Gas (H_2S).
4. Allow to settle.
5. Filter and wash with hot water (distilled) until the ppt. is free from H_2S.
6. Transfer filter paper and ppt. to a beaker.
7. Add 10 cc.'s of hot water.
8. Add 3 to 7 cc.'s of concentrated H NO_3 (CP).
9. Boil until the Silver Sulphide (Ag_2 S) is dissolved. (We get the Silver Sulphide when we pass into the solution the Hydrogen Sulphide Gas.)

10. Add the indicator.
11. Dilute with about 50 cc.'s of water.
12. Titrate with NH_4 S CN from the burette stirring well while titrating.
13. End point slight pinkish color.

Calculations:

R/10 × 1.2 = **oz.** troy of metallic silver per U. S. gal.

Example:

35 cc.'s of NH_4 S CN used 35 ÷ 10 = 3.5 oz. troy of metallic silver per U. S. gal.

Estimation of Carbonates in all Cyanide Solutions

Standard Solutions:

H CL solution 12.36 g/l (H CL must be CP).
Sodium carbonate (Na_2 CO_3) 8.116 g/l.
Normal (N) Barium Chloride (Ba CL_2).

Indicator:

Methyl Orange.

1. Take 5 cc.'s of solution.
2. Add 50 cc.'s of water (distilled).
3. Add 15 cc.'s of normal Ba CL_2 solution.
4. Boil for a few minutes.
5. Allow to settle and filter.
6. Wash the ppt. thoroughly with hot water.
7. Add H CL solution from a burette and add the indicator.
8. Titrate with Na_2 CO_3.

Calculations:

Subtract the reading on the Na_2 CO_3 burette from the number of cc.'s of the H CL solution used and divide this number by 5 which gives oz/U.S. gal.

Gentlemen, time will not permit us to put down here all of our methods of Analysis for the different solutions in the Plating Business, but some time in the not too far distant future we may have time to continue where we have quit.

If there are any pointers in the foregoing Analyses that any one of our members of the A. E. S. does not understand and would like the information concerning that part just communicate with either C. Kemish or B. Deakin, care of the secretary of the

Toronto Branch, A. E. S., and we will try to oblige you with that information.

Yours still seeking for education,

Charles Kemish and Benjamin Deakin.

"WHERE THE RED, RED NOSES GROW"

Take a trip with me
If you want to see
Where the red, red noses grow.
I'm telling you
They never grew
In the Southland
Half so fair.
Where the moonshine flows
Some red noses grow,
But for bloom
You can't compare
With the chromium nose,
That he blows and blows
When the red, red noses grow.
In the chromium plant
It gets its growth,
By inhaling the gas
In your nose and throat,
And the red, red noses grow.
When the blower don't blow
And the chrom don't chrom
And fumes saturate your very dome,
Then the red, red noses grow.
You blow and you sneeze,
Get weak in the knees,
And the red, red noses grow.
You hack and you cough
When the fumes give off
And the claret begins to flow.
The nickel peels,
And the skin reveals
The red, red noses' glow
When you're eating soup;
And the sap it flows,
O pshaw! Gee whiz!
Ask Dad, he knows
Where the red, red noses grow.

E. G. Lovering.

MILWAUKEE BRANCH

March 31, 1928, the Milwaukee Branch held their 9th annual banquet at the New Schroder Hotel in Milwaukee, Wis.

The educational session was in charge of Mr. Pat Sheehan and, as promised, it was a humdinger. Mr. Sheehan surely can preside at these sessions with credit to the Branch and himself.

Prof. Baker of Michigan University lectured and illustrated value of coatings of nickel, copper and chromium in a mighty fine way and his paper was highly instructive.

Mr. Chas. Proctor, founder of the A. E. S., gave a nice lecture on Antique Finishes on Lighting Fixtures and, as usual, Mr. Proctor's offering attracted considerable attention and was considered highly instructive.

Pres. Goodsell of Milwaukee Branch had a nice paper on Brass Plating, and Ray surely knows this subject.

Mr. Paul Legnitz, chemist, gave a breezy talk on Chromium, and covered the subject in its various forms. He is always very entertaining because of unique method of inferring things that gives his audience a chance to make the answer to suit themselves without hurting Paul's good-natured discourse.

We were very sorry that, owing to illness, our good friend, Dad Liscomb, could not be with us and present his slides, and we sympathize with him.

The afternoon session started promptly at 2:30 p. m. with 100 platers, plater foremen and factory representatives, and adjourned at 5:30 p. m. to permit those present to get ready for the feast and dancing.

The banquet and entertainment started promptly at 7:30 p. m., when Mr. J. Geisman introduced the National Quartette and the Melodian Orchestra, all Milwaukee boys and some of whom are members of Milwaukee Branch, A. E. S. Who says platers can't do anything but plate? See John of National Plating Co.

The arrangement committee, consisting of Messrs. Wittig, Hurtig, Geisman, Marx, Koehler, Steurnagel and President Goodsell, are to be congratulated upon such a successful event and we all hope they live to arrange many more pleasant meetings for us.

There were 150 men and ladies present at the evening session, and the ladies surely were a fine inspiration to those privileged to be present and were a gorgeous sight, tripping the light fantastic to the strains of that good music.

In reciprocation of Milwaukee Branch's attendance at Chicago's annual banquet, Chicago Branch was present with about 25 members and there were about 10 people from Chicago, non-members but Chicago Branch rooters, and made quite a representative Chicago crowd.

In traversing the lobby, your Scribe met the following visitors whom he knew:

Mr. and Mrs. Geo. Spencer, Chicago; Messrs. Crumpton and Kelly, and their wives; Mr. R. J. Hozucha and wife; Mr. and Mrs. Geisman,

also of Chicago; Pres. Meyers of Chicago Branch; Past Supreme Pres. O. E. Servis; Messrs. Lamoureaux, Weston, Meggers, Manderscheid, McCable, Henry, Cannon; H. Willmore, Huenerfauth, Jr., Burton Dawes, H. A. Gilbertson, F. Novotny, Mr. and Mrs. Shaw, Freeport, Ill., Mr. Nixon, La Salle, Ill.

Of the local members in attendance it was a treat to see the Wittigs, Gehrkes, Stuernagels, Bykouskis, Leagers, De Cesares, Werners, Koehlers, Birbaums, Zinglers, Sheehans and other members of the Branch and their wives that the Scribe did not get names of.

We are also sorry we can't mention the Goodsells, as Mrs. Goodsell had to content herself in the hospital, having undergone a serious operation the Wednesday previous to the banquet. Our best wishes go to her in her illness.

Before closing, it might be well to mention many of the members showed that they were in pretty good training for the convention at Toronto, June 25, 26, 27, 28, 1928. Some were slightly overtrained when Past Supreme Pres. Barrows greetings were received from Toronto Branch, but they all promised to see Walter in June.

NEWARK BRANCH

President Chas. H. Bohler opened our business meeting on Friday, March 16, with 21 members, 1 visitor present. One application for active membership and one application for transfer to Pittsburgh Branch was read.

Mr. Oliver Sizelove passed around samples of a new deposit under the trade names of "Superradium" and "Majorradium."

The color of these two deposits were not as white as chromium. One deposit needs a mixture of nitric and hydrochloric to dissolve it.

Royal F. Clark, Secy.-Treas.

TORONTO BRANCH

I am glad to tell you we had a very enjoyable evening at our monthly meeting held on Monday, March 26. We elected one new member, Mr. Harold William Graham, of 26 Beatrice street, Toronto. Our librarian, Mr. Chas. Kemish, read a paper from Professor J. T. Burt-Gerrans on the Composition of Crystals in a Silver Bath. Mr. Kemish then showed us the results of some experiments he had made in the analysis of some of these crystals, and a very good showing he made. The silver platers that were present got very interested. Mr. John Acheson gave a detailed account of progress made by the convention committee. Meeting adjourned 11:45 p. m.

J. Ellis, Secy.-Treas.

PHILADELPHIA BRANCH

Regular monthly meeting was held April 6, with President Gehling presiding, with an attendance of 48.

The drawing card being a talk on the experience and plating of die casting by Mr. Robert McLatchie of the Pottstown Plating Works,

who gave an interesting talk how this work is handled, showing specimens of nickel plated auto parts in an all single-salt solution. After answering various question Mr. McLatchie was given a vote of thanks.

Very truly yours,

Philip Uhl, Secy.-Treas.

DETROIT BRANCH

Detroit Branch held its regular business meeting April 12, with 19 members present. Minutes of the previous meeting were read and approved.

The feature of the evening was "The Arithmetical Difficulties of the Electroplater," by Mr. J. F. McCullough.

The members were well pleased with the lecture and a vote of thanks was given him. It was decided to have a smoker at our next meeting in hopes of getting a larger attendance.

The meeting was adjourned at a late hour.

Chas. Mascola, Secretary.

PITTSBURGH BRANCH

Pittsburgh Branch held its regular monthly meeting Saturday evening, April 7, 1928, in the down town branch Y. M. C. A., with Mr. George Hogaboom, of the Hanson Van Winkle-Munning Company, as the speaker of the evening. Mr. Hogaboom at first touchd upon the subject of sensitized paper to show if nickel deposits had any pores that left the steel uncovered. This subject was of interest to some of our members, who took samples of the paper to test their own deposits. It is hoped that the members will make a report of the findings. His main talk was devoted to the "Crystal Structure of Metals," especially of nickel anodes, and the value of heat treatment. This talk was most interesting and instructive and was illustrated by slides, with the aid of Mr. Harold K. Work. The attendance was held down by the heavy rain of the afternoon and evening. Mr. Hogaboom deserves a lot of credit for the work he has done upon this subject. After his talk, Mr. Hogaboom answered numerous questions, and after the conclusion of answers a rising vote of thanks was given him. We were glad to welcome Mr. J. M. Russ, Jr., who has been transferred to our branch from Newark, N. J. Mr. Russ, Jr., will be a valuable addition to our list. It was decided at this meeting to hold a special meeting Saturday evening, April 21, to hear a lecture upon chromium deposition to be given by Mr. E. Steen Thompson of Erie, Pa. This subject seems to be the one big question today and trust that our members will take advantage of this meeting and the efforts of those interested in securing this speaker, and be present and on time. Mr. Herman Peter, our president, is becoming a traveler of note. Last meeting he happened to be in Washington, D. C., and this evening he was in New York. Better stay at home and see what the branch is doing. Adjournment at 10:45 p. m. until April 21 at 8 p. m.

S. E. Hedden, Secretary.

CHICAGO BRANCH

Regular monthly meeting of Chicago Branch held April 14, at the Atlantic Hotel.

Meeting called to order at 8:15. President Meyers in the chair, with a very large attendance.

The report of the Convention Booster Committee was received and from the outlook at present time, Chicago Branch will be well represented at the convention.

We have just learned that the grim reaper has reached into our midst and has taken one of our well-known members, Mr. H. Walters, of Kenosha, Wis., to the great beyond. Chicago Branch will feel the loss of Mr. Walters, and to his family Chicago Branch extends its heartfelt sympathy.

We also extend our good wishes and look forward to a speedy recovery of three members that are on the sick list. If any of the members can visit them it will be a treat to them and will help to cheer them up. The sick are: Mr. J. E. Fox, Mr. John Satka and Mr. Leo Schmidt.

Next meeting will be of great interest, as the election of officers takes place and it will be up to the members to elect officers that will keep Chicago Branch in the limelight, officers that will always be striving to keep our branch the most progressive in the society. Don't fail to attend and help to elect the best.

The regular order of business being completed, the Librarian found the following questions in the question box:

Question 1.—Which is the best way to prepare a plating solution for oxidizing cadium?

Answer 1.—It was suggested to use antimony oxide, providing there was enough mercury present in the deposit, or use a hot solution of water 1 gallon, ammonia 1 pint, molybdic acid 1 pound, using steel anodes.

Question 2.—Why does a steel surface that has been cadium plated rust quicker when there is a break in the deposit?

Answer 2.—It was agreed that the surface being thoroughly clean it was attracted more readily by the atmosphere.

Question 3.—Would it be necessary to nickel plate or copper plate steel articles before cadium plating?

Answer 3.—Not absolutely necessary, but if nickeled first, where break occurred it would prevent rust from forming so rapidly.

Question 4.—What is a good formula for cadium plating sand blasted steel articles?

Answer 4.—Cadium oxide 2 oz., sodium cyanide 7½ oz., caustic soda 1 oz., Cynobrite, mercury, or black molasses were recommended as brightener; this is for still plating.

Question 5.—Is it possible to imitate fire gilt by using fire lacquer?

Answer 5.—Tinted lacquer can be used.

Question 6.—Why is it necessary to add more acid to a barrel nickel solution than to a still solution to keep the P. H. down?

Answer 6.—It is caused by the use of sal ammoniac or improper rinsing.

Question 7.—What is the best speed for nickel buffing steel using 12-inch buffs?

Answer 7.—2,700 to 2,800 revolutions per minute.

Question 8.—What causes the voltage to rise when silver plating? When starting to plate there is 1 volt on tank, eventually it rises to 2½ volts.

Answer 8.—After some discussion the cause could not be explained and the only remedy was to cut down the current or take out some of the anodes.

Question 9.—How can highly polished sheet steel articles be cleaned? We use a caustic soda electric cleaner, at present we are using naphtha or benzine first to take the heavy polishing grease off. Would like to eliminate the naphtha cleaning.

Answer 9.—It was suggested to use an agitated soap solution or use a soak tank before going into electric cleaner.

Answer 10.—From question held from last month relative to stabilizer for chromium baths. After some discussion it was agreed that at present time there has been no stabilizer found is really helpful. It was stated that as to the other metals put in baths as stabilizer that they plate out and only cause the plater more trouble, also that chromium plating can be done as well without the use of other metals as stabilizer.

There being no further business, meeting adjourned at 10 p. m.

S. J. C. Trapp, Secretary.

HARTFORD-CONNECTICUT VALLEY BRANCH

A meeting of the Hartford-Connecticut Valley Branch, A. E. S., was held on Monday evening, March 26, 1928, at 8 p. m., at the Hartford Chamber of Commerce, 805 Main street, Hartford, Conn.

The meeting was called to order at 8:30 p. m. by President Elwin. Two communications were read and placed on file. We elected three new members, all active. We also received two applications for publication.

The banquet committee made a report and are showing much progress. This banquet will be held on May 12, 1928, at the Hotel Bond, Hartford, Conn., and we cordially invite members and friends of all the other branches to attend. More details will follow.

Mr. George B. Hogaboom was then introduced and proceeded to give us a very interesting and colorful description of a trip made last

fall by the members of The American Electro-Chemical Society. This trip lasted a month, and extended from Chicago to the Pacific Coast. They made a visit and inspection of all the most important mines and metal refineries, between Chicago and the Pacific Coast. The talk was certainly appreciated by us. In conclusion Mr. Hogaboom was given a rising vote of thanks.

The meeting was attended by eighteen visitors and members.

The secretary would like to ask all members who have not as yet filled out and sent in their convention slips to do so at once, as these are to be returned to Mr. Gehling, our secretary-treasurer, as soon as possible.

There being no further business, the meeting was adjourned at 11 p. m.

Vernon Grant, Secretary.

DETROIT BRANCH

Detroit Branch, A. E. S., had the privilege of hearing one of the shining lights of the electro-plating industry at its meeting of March 14. Mr. George B. Hogaboom was the guest at dinner at the Detroit Engineering Society Clubhouse, and spoke on the subject of "Crystal Structure of Metals." Mr. Hogaboom treated this metallurgical subject from the viewpoint of the electroplater as well as the metallurgist. With the aid of some very interesting photomicrographic slides, the influence of the physical microstructure of a base metal upon an electro-deposit was demonstrated. The behavior of anodes was also discussed from the angle of their microstructure. The lecture was very enlightening, and provided the answer to many of the perplexing problems of the electroplaters.

C. MASCOLA, Sec'y.

P. S.: Will you please insert an ad in the Review as the Detroit Branch wishes to locate its old member, Mr. E. W. Woodmansee, last heard of in Los Angeles, Calif.

CLEVELAND BRANCH

The attendance at our last meeting was somewhat below what we are used to, perhaps due to the fact that it was the day before Easter, or the rainy weather might have stopped some, but in our opinion the greater reason was that the Secretary did not get the cards in the mail early enough, and perhaps some did not get them at all, for which we humbly apologize and promise to do better in the future.

A communication from Mr. C. M. Moore of York, Pa., asking for a black on cadmium was read and the secretary advised Mr. Moore that we thought plating would do it.

A communication from Mr. Hogaboom was read and laid over to our next meeting so that a larger membership could vote on it.

The quarterly report of our Supreme Secretary was then read and the progress noted.

Mr. E. Steen Thompson then asked for the privilege of the floor under good and welfare and gave a method of determining the chlorides in a nickel solution that is very practical and a minimum of apparatus required. Also, it can be determined in about two minutes per test, which makes it very good for a practical plater and Mr. Thompson agreed to have some typewritten and to give each member present at our next meeting one. Now this ought to be an incentive to come to our next meeting May 5 and show Mr. Thompson that we appreciate him, if for no other reason. We also elect officers for the ensuing year at our next meeting and hope to see a large attendance.

One of our members seems to have a lot of trouble with his lead anodes coating over in his chromium solution so that the voltage goes up and the amperage down, and the work comes out of the solution with bumps and warts on it. Can any of our members help him out with a solution that will dissolve this coating, as he says he has tried sulphuric, muriatic and hydrofluoric acids, with and without current both ways. He has also tried potash but nothing seems to dissolve it, and it has to be removed mechanically. We hope some of our friends will be able to help us out.

We have a very sad thing to report at this time. As Mr. R. H. Sliter has many friends in this society, they will be sorry to hear that he had a stroke of paralysis at Pittsburgh the 7th of December and was recovering fine, then started out on the road. We judge he went too soon. He had another stroke the 18th of March and is now confined to his bed but is getting better slowly and we are in hope the warm weather will be of benefit. His address is 1454 East 110th St., Cleveland, Ohio.

H. J. TERDOEST, Sec'y.

WATERBURY BRANCH

The March meeting of Waterbury Branch, which was presided over by Vice-President Muscio, proved to be quite interesting. Harry M. Johnquist gave an excellent report of the Conference on Electroplating held at the Bureau of Standards Friday, March 2. The principal items of interest touched on by the speaker were: Spotting Out, Composition and Analysis of Cyanides, Overvoltage, Iron Deposition and Addition Agents in Copper Electroptyping Solutions. Mr. Johnquist's talk was a treat to the members and especially so to those who have not heard of and witnessed the activities of the Bureau in plating matters. Richard A. Dimon, formerly of the Bureau of Standards and now with the Scovill Mfg. Co. of this city, also delivered a

few interesting remarks. The meeting of April 12 was the largest gathering held in some time. Librarian Wm. Gray presided and the drawing card for the occasion was Mr. Burgess, general superintendent of the Zapon Lacquer Co., who gave an interesting talk on the Manufacturing and Uses of Lacquers and Enamels. Every detail of the subject was thoroughly gone into with the result that everyone present united in saying that the talk was a most comprehensive one and was greatly appreciated. Delegations from the Hartford and Bridgeport Branches were present. Refreshments topped off a most delightful evening.

W. F. GUILFOILE.

APPLICATIONS

	Branch
Wm. E. Welch, Berkshire Road, Hasbrouck Heights, N. J.	Newark
W. D. MacDermod, Hartford, Conn.	Hartford, Conn., Valley
E. F. Flemming, Bristol, Conn.	Hartford, Conn., Valley
W. E. Berg, Empire Plating Co., Cleveland, Ohio.	Cleveland
Ralph A. McCahan, c-o American Fork & Hoe Co., Geneva, Ohio	Cleveland
H. N. Long, 159 W. Lehigh Ave., Philadelphia, Pa.	Philadelphia
Geo. M. Long, 159 W. Lehigh Ave., Philadelphia, Pa.	Philadelphia
Anthony Tyburski, 1744 N. Wood St., Chicago, Ill.	Chicago
John Hamilton, 3011 Addison St., Chicago, Ill.	Chicago

ELECTIONS

	Branch
Peter J. Belom, Bristol, Conn.	Hartford, Conn., Valley
A. W. Westerberg, Springfield, Mass.	Hartford, Conn., Valley
Wm. Seidel, Holyoke, Mass.	Hartford, Conn., Valley
W. E. Uric, 647 State St., Lancaster, Pa.	Philadelphia
E. L. Ollivier, Route 2, Lansdale, Pa.	Philadelphia
Arthur James Pankau, 4539 N. Albany Ave., Chicago.	Chicago
Herman Hebestreit, 34 Florence Ave., Irvington, N. J.	Newark
Wm. F. O'Connell, 845 So. 17th St., Newark, N. J.	Newark

REINSTATEMENTS

	Branch
L. V. Taylor, 1394 East 2nd Street, Brooklyn	Newark

TRANSFERS

	Branch
J. M. Russ, Jr., from Newark to	Pittsburgh

DEATHS

	Branch
Wm. P. Echfeldt	Philadelphia
Homer Walters	Chicago